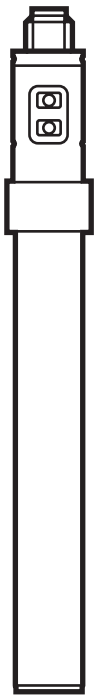
ifm electronic

Operating instructions
Binary level sensor

efector160®

LI51

UK



704367 / 02 02 / 2013

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1 Preliminary note

1.1 Symbols used

▶ Instruction

> Reaction, result

[…] Designation of pushbuttons, buttons or indications

→ Cross-reference

Important note
Non-compliance can result in malfunctions or interference.

Information
Supplementary note.

2 Safety instructions

- Please read the product description prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.
- Installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.
- The unit conforms to the standard EN 61000-6-4. The unit may cause radio interference in domestic areas. If interference occur, the user must take appropriate remedial actions.

3 Functions and features

The unit monitors the level of liquids in tanks.

3.1 Application area

- Water, hydrous media, oils, coolant emulsions.

3.2 Restriction of the application area

- The unit is not suitable for acids, alkalis, granulates, bulk materials.
- It is not suitable for hygienic areas.
- Highly conductive foam can trigger a switching operation. Check the consequences by performing a test in your application!
- For water and hydrous media with temperatures > 35° C install the unit in a climatic tube (order no. E43100 ... E43103).
- Maximum tank pressure: ±0.5 bar (when mounted using the appropriate mounting accessories; →chapter 5.2 Installation procedure).

4 Function

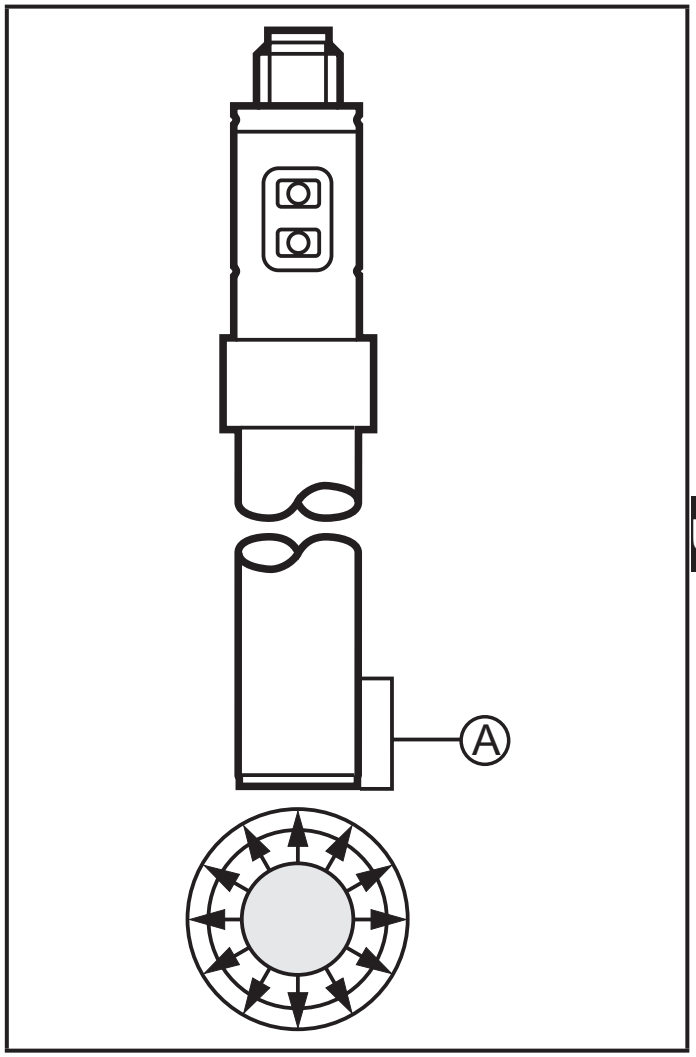
4.1 Measuring principle

The unit operates to the capacitive measuring principle. By direct contact with the medium the unit detects whether the requested level (limit level) is reached and indicates this by a switched signal.
The dielectric constant of a medium is important for its detection. Media with a dielectric constant > 1.8 are safely detected.

Dielectric constants of common liquids	
mineral oil	≈ 2
coolant emulsion	≈ 25...75
glycol	≈ 37
water	≈ 80
water, demineralised	≈ 30

Electrically conductive and non conductive media are detected.

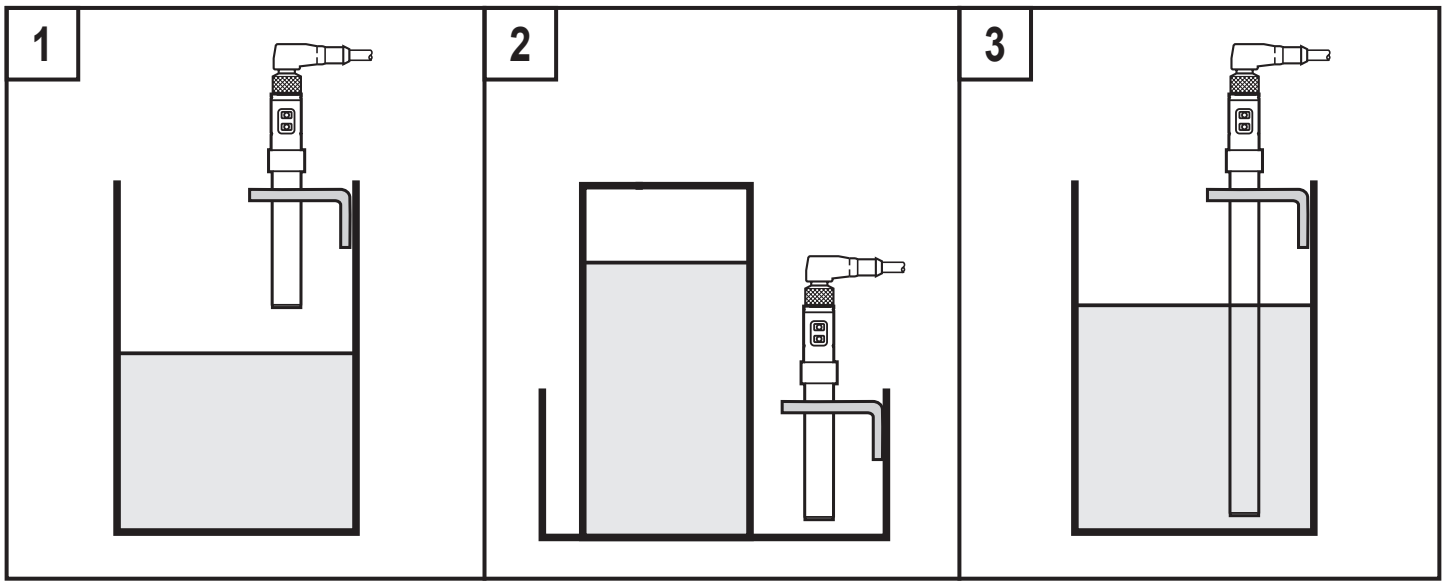
The unit operates with radial detection characteristics. Therefore media below the active zone are not detected. Despite different electrical properties media are only detected when the active zone (A) is covered.



4.2 Features of the unit

- NO or NC function can be set by programming buttons (→ chapter 8 Settings)
  - NO function: output closed when the level has been reached / output open when the level has not been reached.
  - NC function: output open when the level has been reached / output closed when the level has not been reached.
- Automatic adjustment function to the medium to be detected by programming buttons (→ chapter 8 Settings). This allows reliable detection of media with a low dielectric constant (e.g. oil).
- Level selectable by the installation length (→ 5.3).
- The unit is virtually immune to build-up on the probe of almost any kind. The position of the switching level within the active zone can however change with build-up.
- Operating and switching status indication via LED ring.

4.3 Application examples



1: Overflow protection in a supply tank for coolant emulsion.
2: Leakage monitoring in the overflow vessel of a hydraulic power pack.
3: Minimum level monitoring

5 Installation

5.1 Installation location / environment

- Vertical installation from the top is preferred (→ 5.3).
- The following minimum distances must be adhered to:

Distance tank bottom - end of the probe: 10 mm.
Distance metal tank wall - probe: 20 mm.
In small plastic tanks: mount the unit in the middle of the tank, where possible.
Distance between several LI51 units: depending on medium and application. Guide values for standard applications (distance from the centre of a probe to the centre of another probe): - Water / coolant emulsion in a grounded metal tank: 40 mm. - Oils in a grounded metal tank: 100 mm. - Water, aqueous media and oils in an ungrounded plastic tank: 200 mm. Depending on the application greater distances can be required. Please check this by a function test under real operating conditions.
Distance between LI51xx and LKxxxx units: min. 60 mm from the centre of a probe to the centre of another probe.

5.2. Installation procedure

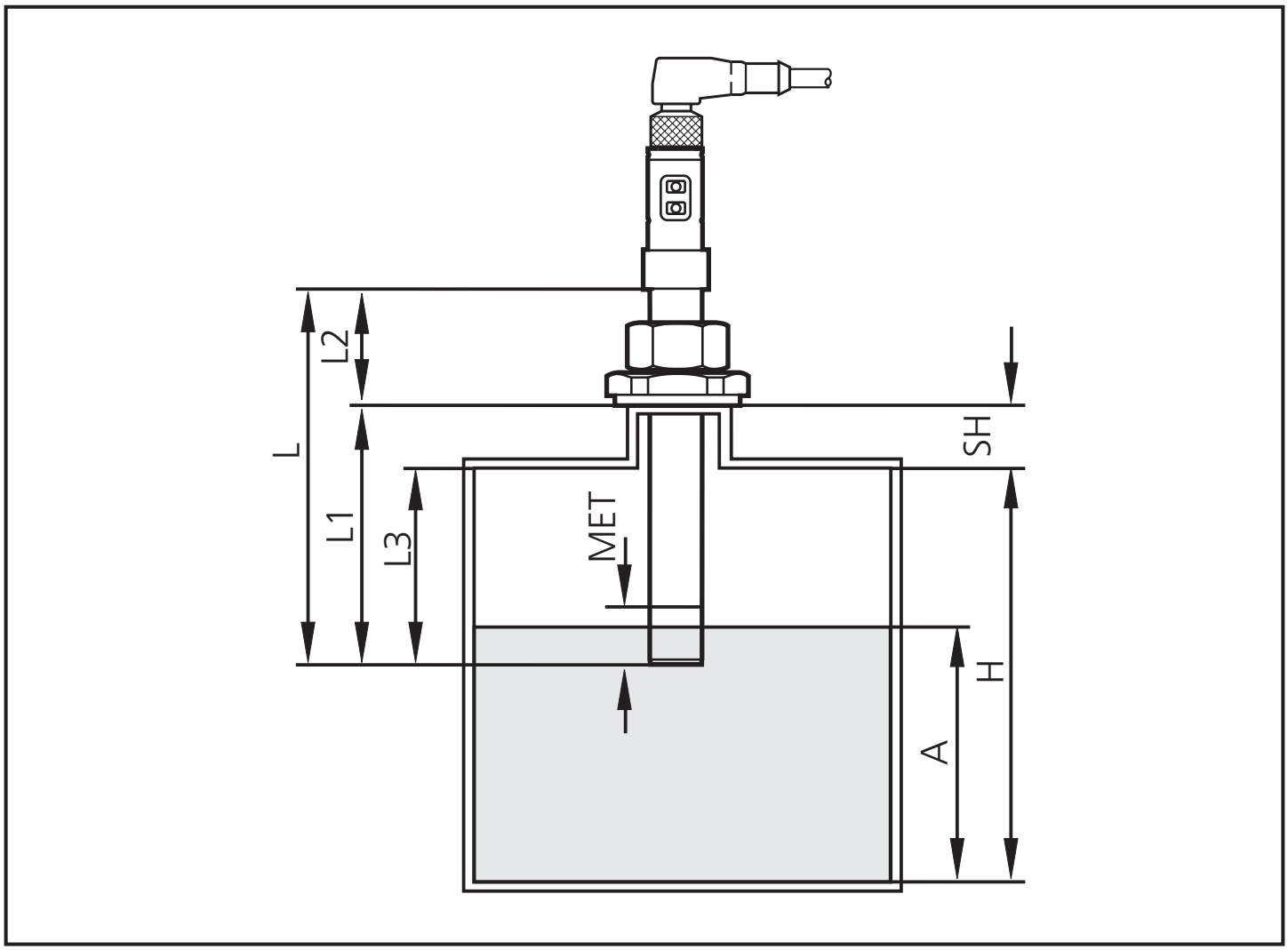
The unit is mounted using a mounting clamp or an adapter. The following standard mounting accessories are available:

Order no.

- mounting clamp (for non-pressurised tanks)..... E43000
- mounting clamp with mounting bracket (for non-pressurised tanks)..... E43016
- flange plate with clamp adapter (pressure rating of 0.5 bar)..... E43001
- welding adapter with clamp adapter (pressure rating of 0.5 bar)..... E43002
- mounting adapter G¾ with clamp adapter (stainless steel, pressure rating of 0.5 bar)..... E43003
- mounting adapter G1 with clamp adapter (stainless steel, pressure rating of 0.5 bar)..... E43004
- mounting adapter G¾ with clamp adapter (brass, pressure rating of 0.5 bar)..... E43019

Further accessories on request.

5.3 Set the installation length



A = response level
H = tank height
SH = height of the connection piece
L = probe length
L1 = installation length
L2 = extension length
L3 = mounting length (at least 60 mm)
MET = maximum installation depth (= active zone; 31 mm)

► Select the installation length L1 so that at least half the MET zone is covered when the response level A has been reached, that is:
L1 = (H - A) + ½ MET + SH.

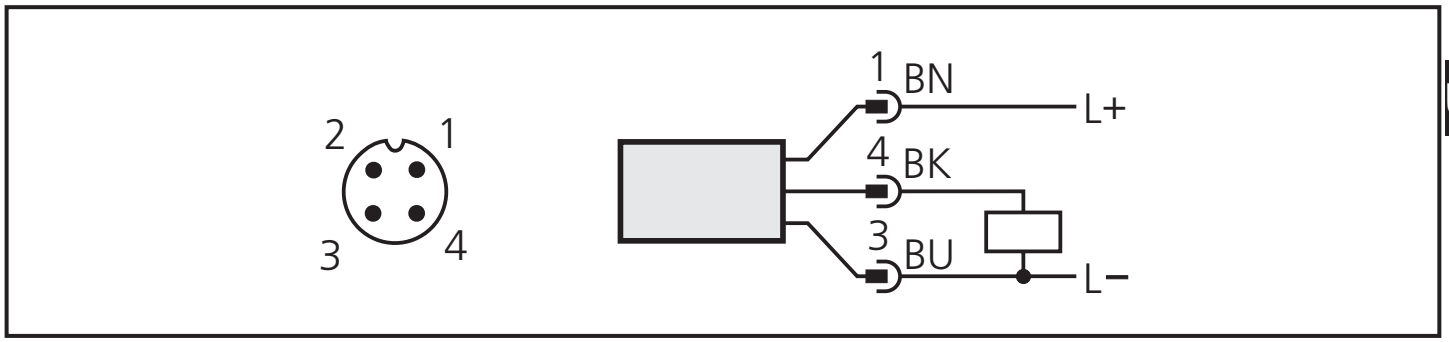
The unit switches when the level reaches the MET zone. The exact position (exact response level) depends on the following factors:

- characteristics of the medium.
- installation conditions.
- adjustment of the unit (→ chapter 8 Settings).

6 Electrical connection

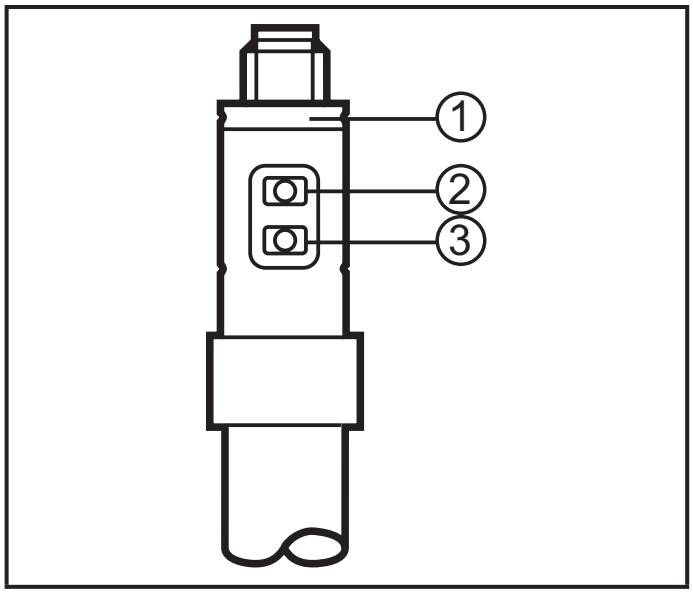
The unit must be connected by a qualified electrician.
The national and international regulations for the installation of electrical equipment must be adhered to.
Voltage supply to EN 50178, SELV, PELV.

▶ Disconnect power.
▶ Connect the unit as follows:



core colours of ifm sockets:
1 = BN (brown), 3 = BU (blue), 4 = BK (black)
The unit can be used as NO or NC unit; → chapter 8 Settings.

7 Operating and display elements



1: LED ring green / yellow
  • green: operation display
  • yellow: switching status indication
2: programming button OUT OFF
3: programming button OUT ON

8 Settings

Before the first set-up the basic teach empty state must be carried out.

8.1 Carry out the basic teach empty state

The basic teach empty state sets the unit to the empty tank and the installation conditions (e.g. the set installation length). Previous settings are deleted.

▶ Empty the tank until the medium is at least 20 mm below the end of the probe.
▶ Press [OUT OFF], keep it pressed for min. 2 s / max. 6 s.
> The yellow LED flashes slowly. When the button is released, it goes out. The unit is then ready for operation and set as NO unit (output ON when the level has been reached).

If the unit is to be set as NC unit:

▶ After emptying the tank press [OUT ON] instead of [OUT OFF]. After releasing the pushbutton, the yellow LED lights continuously.

8.2 Carry out the basic teach full state

The empty adjustment is sufficient for media with a low dielectric constant (e.g. oils). For aqueous media the sensitivity must be optimised by a full adjustment. The full adjustment does not change the settings of the empty adjustment.

▶ Fill the tank until the active zone of the unit is covered.
> If the unit is set as NO unit (→ 8.1), the yellow LED lights, if it is set as NC unit, it goes out.
▶ If the unit is set as NO unit: press [OUT ON] and keep it pressed for at least 6 s.
> The yellow LED flashes slowly, after 6 s it flashes quickly. After releasing the pushbutton, it lights continuously.

If the unit is set as NC unit: After filling the tank press [OUT OFF] instead of [OUT ON]. After releasing the pushbutton, the yellow LED goes out.

8.3 Set the deposit suppression (option)

This setting largely suppresses deposits in the tank and on the probe. Previous settings are not changed.

▶ Empty the tank until the medium is at least 20 mm below the end of the probe end. If the unit is set as NO unit (→ 8.1), the yellow LED goes off, if it is set as NC unit, it lights.
▶ If the unit is set as NO unit: press [OUT OFF] and keep it pressed for at least 6 s.
> The yellow LED flashes slowly, after 6 s it flashes quickly. When the button is released, it goes out.

If the unit is set as NC unit: After emptying the tank press [OUT ON] instead of [OUT OFF]. After releasing the pushbutton, the yellow LED lights continuously.

8.4 Lock / unlock the unit

The unit can be locked electronically to prevent unintentional settings.

▶ Press both setting pushbuttons simultaneously for at least 10 s in the operating mode.
> The yellow LED temporarily changes its status:
- If it lights at the beginning of the setting operation, it goes out for a few seconds.
- If is does not light in the beginning, it lights for a few seconds. Then the unit is locked or unlocked.

On delivery: unlocked.

9 Operation

When the supply voltage has been applied, the unit is in the operating mode. It carries out its measurement and evaluation functions and switches the output.

Operation indication by LED:

	LED green	LED yellow
unit ready for operation, output closed	OFF	ON
unit ready for operation, output open	ON	OFF

10 Maintenance, repair and disposal

Recommended maintenance:

▶ Check the probe for build-up from time to time, clean it in case of strong soiling.

After removal of the unit or a change of media with dielectric constants that differ greatly (e.g. oil / water) another adjustment should be carried out.

It is not possible to repair the unit.
After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

11 Technical data and scale drawing

Technical data and scale drawing at www.ifm.com → Data sheet search → Enter the article number.

More information at www.ifm.com